
INTRODUCTION

Highway construction has been identified as a primary source of soil erosion and sediment loss. Construction of highways typically disturbs large areas of natural vegetative cover that can result in an accelerated rate of soil erosion. In contrast to highways of the past where the roadways were narrow and profiles followed the contour of the land, contemporary highways have wider cross sections and flatter profiles, which results in large areas of land disturbance, high fills and deep cuts (Figures 1.1 and 1.2). Consequently, highway design and construction requires careful consideration for erosion and sediment control.

Erosion and sedimentation from construction sites can have environmental and economic impacts. Environmentally, some of the more common impacts of excessive erosion include:

- Turbidity, which reduces in-stream photosynthesis and increased water temperatures, leading to reduced food supply and aquatic habitat;
- Introduction of soil nutrients into waters that cause algal blooms, which reduces water clarity and depletes oxygen;
- Sedimentation of stream bottoms that blankets fauna and destroys spawning areas; and
- Removal of top soil that leaves hard, rocky and infertile soil, which is difficult to revegetate.

Figure 1.1 Today's highways have wide cross sections that result in large areas of land disturbance



These environmental impacts result in damage to aquatic habitat that is difficult to quantify in terms of costs. However, the economic impacts go beyond the cost of damage to natural resources. For example: excessive accumulation of sediment in streams and reservoirs can require dredging at very high costs; replacement and repair of eroded soil can be very expensive; and sediment removal from roadways, channels and culverts can produce additional maintenance costs and cause flood damage (Figure 1.3).

Excessive sedimentation can also disturb the physical stability of ephemeral channels, resulting in accelerated rates of erosion and sediment deposition within the channels. Increased erosion and deposition can result in damage to native vegetation and subsequently to local wildlife populations for which ephemeral stream channels are important habitats and movement corridors. Increased channel erosion and sedimentation can also lead to accelerated delivery of sediment downstream to intermittent and perennial stream channels, thereby damaging those environments as well.

The Arizona Department of Transportation (ADOT) has adopted this manual to assist in developing erosion and pollution control during both design and construction of roadways.



Figure 1.2 (Above) Rill erosion on cut slope



Figure 1.3 (Below) Sedimentation at storm drain

There are three main goals:

- Reduce erosion potential.
- Reduce off-site sedimentation.
- Prevent contamination by construction materials.

These goals are achieved by means of both permanent and temporary storm water Best Management Practices (BMPs).



Figure 1.4 When properly designed, today's highways carefully fit into the physical and visual landscape

1.1 PURPOSE OF MANUAL

The overall purpose of this manual is three-fold:

- To outline ADOT's procedures for complying with water quality regulations and permits.
- To provide a "tool box" of available BMP's.
- To provide guidance for the selection of BMPs on ADOT construction projects.

1.2 WATER QUALITY REGULATIONS AND PERMITS

All ADOT construction projects must comply with federal, state and local water quality regulation and permit requirements. Attention must be given to these regulations and permit requirements through-out the planning, design and construction of a project to insure that the quality of the waters of the U.S. is not compromised. The following is a general overview of the pertinent regulations and permitting requirements.

1.2.1 Arizona Department of Environmental Quality's (ADEQ's) Arizona Pollution Discharge Elimination System (AZPDES) Storm Water Permit Requirements.

On Dec. 5, 2002, Arizona became one of 45 states with authorization from Environmental Protection Agency (EPA) to operate the National Pollutant Discharge Elimination System (NPDES) Permit Program (Section 402 of the Clean Water Act) (CWA) at the state level. Under the AZPDES Permit Program, all facilities that discharge pollutants from any point source into waters of the U.S. are required to seek coverage under an AZPDES permit. Pollutants can enter waters of the U.S. from various sources including agricultural, domestic, and industrial. For regulatory purposes, these sources are generally categorized as either point source or non-point sources.

For similar types of construction activities, the ADEQ has issued a Construction General Permit (CGP), Arizona Construction General Permit (AZCGP) No. AZG2003-001, which is available to provide storm water permit coverage to all construction projects in the State of Arizona (except on Tribal Trust Lands where the construction general permit is issued by the EPA, termed the Federal Construction General Permit or FCGP in this document). In order to comply with the conditions of either the AZCGP or the FCGP, the operator is required to file a Notice of Intent (NOI) with ADEQ or EPA if construction and construction-related activities, including all clearing, grading, excavation, and stockpiling activities, will result in the disturbance of equal to or greater than one acre. ADEQ or EPA approves the specific project use of the general permit for storm water discharges by accepting and approving the NOI. If ADEQ or EPA denies NOI approval, the operator may have to pursue an individual storm water discharge permit for the project.

The AZCGP specifies allowable storm water discharges (Part I.C) from construction sites and requires the operator to meet water quality standards through implementation of temporary and permanent BMPs and other measures. Compliance with the requirements of the AZCGP constitutes compliance with the National Pollution Discharge Elimination System permit. In order to obtain coverage, construction contractors under contract to ADOT and ADOT representatives shall:

- Comply with all terms and conditions of the AZCGP or FCGP.
- Prepare and implement a site specific Storm Water Pollution Prevention Plan (SWPPP) which meets the minimum requirements of Part IV of the AZCGP.
- Submit an NOI to ADEQ after the contract has been awarded and before any construction activity begins (the NOI is submitted to the EPA if the project is located on Tribal Trust Lands). These requirements are described under Part II.B and Part III of the AZCGP.

- Submit a Notice of Termination (NOT) to ADEQ when construction is complete, all permanent erosion and sedimentation controls are in place, and final stabilization has been achieved to meet the requirements described in Part II.C of the AZCGP. The NOI is submitted to the EPA if the project is located on Tribal Trust Lands.

Chapters 3 and 4 of this manual provide instructions for preparing a SWPPP and completing the NOI and NOT forms for ADOT projects.

1.2.2 Federal Highway Administration Erosion Control Guidelines

Section 1057 of the Intermodal Transportation Efficiency Act of 1991 (ISTEA) requires the Federal Highway Administration (FHWA) to develop erosion and sediment control guidelines for States to follow when building highways using Federal funds. FHWA has formally adopted the American Association of State Highway and Transportation Officials (AASHTO) Highway Drainage Guidelines, Volume III (see Reference 1, Appendix c), for this purpose. Each State highway agency is required to comply with the AASHTO Guidelines or to develop and apply their own more stringent guidelines.

1.2.3 Section 404 of the Clean Water Act

Section 404 of the CWA regulates the discharge of dredged or fill material within the waters of the U.S. and establishes a program to issue permits. In Arizona, the U.S. Army Corps of Engineers (Corps) administers this program. In addition, the U.S. Fish & Wildlife, the National Marine Fisheries Service and State resources agencies (e.g., ADEQ, Game and Fish Department, Water Resources) have important advisory roles. The phrase “discharge of dredged or fill material” includes all earthwork activities such as clearing, grading, filling, and excavating.

The 404 program has considerable impact on the design, construction and maintenance of Arizona’s highways. Essentially, any proposed work in washes, rivers, streams, lakes and wetlands requires ADOT’s Environmental and Enhancement Group (EEG) to obtain a permit from the Corps. During construction, the Corps evaluates adherence to permit conditions. Typical projects that are affected include the construction and maintenance of culverts, bridges, and stream bank erosion protection.

There are two types of 404 permits: nationwide permits and individual permits. Nationwide permits are general permits designed for allowing minor, noncontroversial projects that are similar in nature, and which create minimal impact on the environment. Individual permits are required for projects that do not meet the terms and conditions for a nationwide permit. They require greater scrutiny by the Corps, other regulatory agencies and the public.

Requirements for nationwide permits in Arizona are found in the Corps Special Public Notice dated April 19, 2002. Some projects may require an individual permit. The Corps should be contacted for determination of permit requirements.

U.S. Army Corps of Engineers
Regulatory Branch
3636 N. Central Avenue, Suite 900
Phoenix, AZ 85012-1939
(602) 640-5385
FAX (602) 640-2020

The federal Section 404 permit program can be easily confused with the ADEQ, Section 402, AZPDES program. It is important to remember, however, that they are two separate and distinct regulatory programs. The distinction is that a Section 404 permit provides permission to add fill material to the waters of the U.S., whereas an AZPDES permit provides permission to discharge treated storm waters to the waters of the U.S. in compliance with permit limitations, conditions and BMPs.

1.2.4 Section 401 of the Clean Water Act

Section 401 of the CWA enables the States to provide certification that the draft 404 permit is in compliance with State law. ADOT Environmental Planning Group obtains 401 Certification during the design process. The purpose of Section 401 is to ensure that the proposed activity meets the State's water quality standards and any other pertinent state-required criteria. In Arizona, ADEQ performs the State Water Quality Certification Review for all areas of the State with the exception of Indian Reservations. For projects within the White Mountain Apache Reservation, the Tribal Environmental Planning Office performs certification reviews. For projects within all other Indian Reservations in Arizona, EPA performs certification reviews.

Section 401 certification requirements apply to all activities regulated under Section 404 of the CWA. The certification review evaluates proposed projects for compliance with state water quality standards and consistency with approved water quality planning and management programs. ADEQ may approve or deny certification for any Section 404 Permit based on the anticipated effect on water quality. A Letter of Certification will be issued by ADEQ if the applicant is in compliance with these standards and conditions.

In order to obtain a letter of certification from ADEQ, construction contractors under contract to ADOT and ADOT representatives shall contact ADEQ Water Permits Division.

1.2.5 Additional Federal Land Requirements

There are several agencies within the U.S. government that manage public lands and may have their own erosion and pollution control requirements. These agencies include the BLM, the BIA, the U.S. Forest Service, the National Parks Service and the U.S. Fish and Wildlife Service. Each affected agency shall be included in the planning and design process when roadway plans are prepared within their jurisdictions. Doing so will ensure that their requirements are incorporated into the plans.

Contact Information:

Bureau of Land Management – <http://www.blm.gov/nhp/>

Bureau of Indian Affairs - www.doi.gov/bureau-indian-affairs.html

The U.S. Department of Agriculture Forest Service – www.fs.fed.us/

Southwestern Region
USDA Forest Service
333 Broadway SE
Albuquerque, NM 87102
(505) 842-3192

The National Parks Service – www.nps.gov/

Pacific West Region, Regional Director
National Park Service
One Jackson Center
1111 Jackson Street
Suite 700
Oakland, CA 94607
(510) 817-1300

U.S. Fish and Wildlife Service – www.fws.gov/

Southwest Region 2
500 Gold Ave. SW
Albuquerque, NM 87102
(505) 248-6635

1.2.6 State and Local Government and Agency Requirements

The Arizona State Land Department does not have a specific policy on erosion control for construction projects but rather reviews projects on a case-by-case basis. For projects that are located on State Trust Land contact:

Arizona State Land Department
Right-of-Way Section
1616 W. Adams St.
Phoenix, AZ 85007
(602) 542-4098

Other environmental issues such as archaeological and/or historic sites may be identified during project planning and design that affect design and construction activities. These issues may affect the contractor's proposed activities outside of the approved right-of-way.

Projects may also be located within the jurisdictions of local governments. These may include Municipal Separate Storm Sewer Systems (MS4) and County Flood Control Districts. Each affected agency shall be included in the planning and design process when roadway plans are prepared within their jurisdictions. This will ensure that their requirements are incorporated into the plans.

Contact Information:

Local Government Units

Phone Listings in Government Pages
Arizona Council of Governments Website
<http://www.mag.maricopa.gov/archive/AZ-COGs/index.html>

Municipal Separate Storm Sewer Systems

Arizona Department of Environmental Quality Listings
<http://www.adeq.state.az.us/environ/water/permits/stormwater.html>

EPA Region 9: Water Programs Website
<http://www.epa.gov/region09/water/npdes/stormwater.html>

County Flood Control Districts

Phone Listings County Government Pages
Arizona Association of Counties Website
<http://www.azcounties.org/home/index.cfm>

1.3 BEST MANAGEMENT PRACTICE (BMP) SELECTION AND DESIGN

As used in this document, the term BMP refers to operational (non-structural) activities or physical controls (structural) that prevent or reduce the discharge of pollutants and minimize potential impacts upon receiving waters.

Proper BMP design, selection and installation are essential to achieve the goals of this manual. BMP selection begins during the design phase but must be continued by the contractor and ADOT throughout the life of the project. The most effective way to reduce erosion and offsite sedimentation and to prevent the contamination of storm water is to select and install BMPs that best fit the specific conditions encountered.

This manual provides the following:

Chapter 2:

Design guidance for incorporating storm water quality controls in projects during the planning and design phases.

Chapter 3:

Instructions to the contractor for obtaining a Construction General Permit.

Chapter 4:

Instructions to the contractor for preparing a SWPPP, a necessary requirement of the General Permit.

Chapter 5:

Descriptions of both temporary and permanent BMPs for consideration by ADOT and the contractor during design and construction of ADOT projects.